PROPERTY PLANNING COMMON ELEMENTS

COMPONENTS OF MASTER PLANS

HABITATS AND THEIR MANAGEMENT

Bottomland Hardwoods

Description

Bottomland hardwoods occur along rivers and streams, mainly in the southern half of the state but also at scattered locations in the north. The largest tracts are found along the Mississippi and lower Wisconsin Rivers, with significant stands also occurring on the Chippewa, Black, Yellow, Baraboo, Wolf, Sugar, Rock, St. Croix, and lower Peshtigo. Small tracts are found along many smaller rivers and streams. Important canopy species include silver maple, green ash, river birch, swamp white oak, red maple, black willow, cottonwood, and hackberry. Several tree species more typical of the southern U.S., such as sycamore, honey locust, and mulberry can be found locally among bottomland hardwoods in southern Wisconsin. American elm, formerly an important canopy species in these forests, has been greatly reduced by Dutch elm disease and now rarely reaches the canopy before succumbing, although young trees are still fairly common. Common understory species, often occurring in a patchy distribution, are wood nettle, jewelweed, sedges and grasses, green dragon, cardinal flower, and green-headed coneflower. Vines such as Virginia creeper, poison ivy, wild grape, moonseed, and wild cucumber can be prominent. Canopy openings may be invaded by thickets of native shrubs such as prickly ash and dogwoods, while sloughs and the margins of oxbow ponds often have the water-loving buttonbush. Northern occurrences tend to be less extensive than those in the south, often discontinuous, and comparatively species-poor, though they do support species that are rare or absent elsewhere in northern Wisconsin. Silver maple and green ash remain among the dominant canopy species, with balsam-poplar, bur oak, and box elder replacing some of the associated southern tree species.

Bottomland hardwood forests typically vary in structure and composition at both local and landscape scales due to the effects of variations in topography, soils and hydrology, and natural processes such as beaver activity and windthrow. Many such forests are naturally interrupted by sloughs, ponds, shrub swamps and meadows, and by even drier barrens habitats on sandy terraces, but these habitats are often interconnected in extensive mosaics with gradual, natural ecotones.

In general, wet floodplain sites tend to be dominated by silver maple and green ash. River birch is sometimes common, especially along the lower Wisconsin and Mississippi rivers and the lower reaches of their tributaries. Active or deadwater sloughs, stream and river channels that often interrupt floodplain forest cover, are overhung to varying extents by the spreading, hanging canopies of silver maple or cottonwood, and formerly American elm. Higher, wet-mesic sites have these same species but with increased prevalence of swamp white oak, hackberry, white ash, basswood, and (on higher, sandier terraces) black oak and, rarely, white pine. With fewer openings than wet forests, and more prevalent shrub and sapling layers, wet-mesic forest structure tends to resemble that of upland forest. In areas of former glacial lakes (e.g., Central Sand Plains and Hills), or along the conduits that drained them (e.g., Lower Chippewa and especially Lower Wisconsin), terraces can be sandy, and xeric for much of the year, adding an additional component of “river barrens” to the floodplain mosaic, characterized by sparse cover of grasses and forbs, open sand, river birch, green ash, red cedar and black oak. On some expansive terraces with deep, sterile sands, these species are joined by jack pine and sand prairie herbs. Depending on the topographic position, newly exposed soil tends to be pioneered by thickets of sandbar willow shrubs, black willow,

river birch and cottonwood, while thicker or higher, somewhat drier deposits on higher terraces often are invaded by river birch, cottonwood, green ash, oaks and prickly-ash.

Bottomland hardwoods and other floodplain habitats are adapted to – and driven by – disturbance. Periodic flooding, particularly in spring, is the primary natural disturbance that historically has shaped this community. The frequency, timing, duration, and extent of flooding can alter floodplain topography and influence the species composition and structure of both canopy and understory vegetation layers. Flooding can cause scouring effects from water, ice, and debris that damage or remove vegetation and expose sand or mud on spits or slough margins, can leave tangles of dead branches and other detritus, and can deposit sediments containing nutrients and organic matter that alter the microtopography of the floodplain. Floods can also carry in seeds and other propagules of plant species. Many bottomland tree species are early-successional and are adapted to exploit the conditions created by periodic floods and frequent disturbance. Bottomland hardwoods tend to be fast-growing, utilizing the relatively high levels of nutrients and moisture supplied in floodplains to maintain rapid growth. Many species take advantage of, or require, bare soil for seed germination. For example, silver maple requires a fresh deposit of silty soil as a seedbed. Flooding affects stand structure by influencing the survivorship of seedlings based on their location in the floodplain. Seedlings that become established on the higher elevations of a floodplain are more likely to survive the effects of subsequent floods than those established on the lower elevations. At lower elevations this can result in stands with widely spaced canopy trees and sparse woody understory, with a dense groundlayer of wood nettles and a few other herbs that respond quickly to floodwater recession. Higher sites typically exhibit more regeneration, a denser shrub layer, and a more diverse herbaceous layer.

Other natural disturbances shape the structure, composition and landscape pattern of bottomland hardwoods as well. Most of the common tree species are shallow-rooted and subject to throw by windstorms, which can be funneled along river valleys. Canopy disturbance can range from minor to severe, depending on the wind event. Beaver can fell saplings and even large canopy trees, and create impoundments that flood out forest tracts, which may, after drainage, persist as open meadows. Historically, fire was necessary to maintain floodplain savannas (typically dominated by swamp white oak or bur oak), black oak-jack pine barrens on more xeric terraces, and some marshes, meadows and shrub swamps that characteristically interrupt forest cover, especially near uplands. In Wisconsin, fire has been frequent both historically and currently in portions of the lower Chippewa, lower Black, and lower Wisconsin rivers, and formerly occurred on the Mississippi. Stands on sand and gravel may be predisposed to fire after periods of seasonal drought.

Historically limited in extent and distribution, bottomland hardwood forests have declined significantly since Euro-American settlement, though they have fared better than other native communities due to the difficulty of converting them to other land uses. Remaining tracts have been fragmented and degraded by a variety of human activities including unsustainable logging, grazing, ditching, clearing for agriculture, invasion by exotic species, and alteration of flood regimes on many streams and rivers due to dam construction, road construction, channelization, wetland drainage, and urban development. Some new floodplain forest has developed since Euro-American settlement due to succession on meadow and oak savanna sites (sometimes after a period of cultivation), facilitated by reduced flooding, absence of fire, and removal of grazing livestock.

Ecological Landscape Opportunities

Ecological Landscape	Opportunity*
Central Sand Plains	M
Southeast Glacial Plains	M
Western Coulee and Ridges	M

Ecological Landscape	Opportunity*
Central Lake Michigan Coastal	I
Central Sand Hills	I
Forest Transition	I
North Central Forest	I
Northern Lake Michigan Coastal	I
Superior Coastal Plain	I
Western Prairie	I
Northeast Sands	P
Northern Highland	P
Northwest Sands	P
Southern Lake Michigan Coastal	P
Southwest Savanna	P

M = Major; major opportunity exists in this Landscape; many significant occurrences are recorded, or restorations likely to be successful.

I = Important; several occurrences important to maintaining the community in the state occur in this Landscape.

P = Present; community is present in the Landscape but better opportunity exists elsewhere.

Rare Species

Many Species of Greatest Conservation Need (SGCN) are associated with bottomland hardwood forests based on the findings in Wisconsin's 2015 Wildlife Action Plan. To learn more, visit the Southern Forest communities page and click on 'Floodplain Forest".

Threats

- Altered hydrology is a primary threat to bottomland hardwoods as the hydrologic regime is a defining feature of this forest type, affecting many of its physical characteristics. Dam and impoundment construction on many rivers and streams has affected the timing, frequency, duration, and magnitude of flood events. This has altered the major natural disturbance to which bottomland hardwoods are adapted, with consequences for species composition and structure, and future successional pathways. This type of flow regulation often is characterized by flooding that is less extreme but more frequent than that experienced under a natural flood regime. Flood control in effect lessens the impacts of both spring floods and summer low-flow periods. This results in a lack of erosion and deposition that creates 'new land' where early-successional species can thrive, or more frequent inundation that does not allow trees to become established. A lack of severe flooding may also be leading to succession based on shade tolerance rather than flood tolerance.
- Exotic diseases, insects, and plants are a significant and increasing threat to bottomland hardwood forests. Dutch elm disease has virtually eliminated American elm as a canopy dominant, altering stand structure. Emerald ash borer threatens the ash component and gypsy moth threatens oaks and other species. The exotic, highly invasive reed canary grass can spread rapidly after a disturbance that opens the canopy, such as timber harvest, windthrow, or disease, and quickly dominate the ground layer, impeding tree regeneration. Other problematic invasive plants are common and glossy buckthorns, and Japanese hops. The native prickly ash can become invasive in some cases.

- Heavy logging in some sites may result in "swamping", a raising of the water table due to reduced evapotranspiration, which can damage or kill any remaining trees and lead to lack of regeneration and replacement of the stand with wetland shrubs, sedges, cattails, or reed canary grass.
- Clearing for agriculture or development or conversion to another habitat type (e.g., marsh or shrub wetlands due to dike construction) has fragmented and reduced the extent of bottomland hardwoods and threatens existing tracts. Existing tracts also may be degraded by neighboring land uses (e.g., sedimentation or pollution from adjacent agriculture or construction), unsustainable logging, and grazing.
- Excessive herbivory by white-tailed deer or domestic livestock can alter the composition of understory layers, impede tree regeneration, and contribute to the spread of invasive species such as prickly ash and buckthorn.
- The increased probability of more extreme disturbance events associated with climate change, such as heavy downpours that lead to rapid, severe, more frequent midsummer flooding, may have negative consequences for floodplain systems. A decline in the duration of frozen-ground conditions may make forest management in this cover type more difficult.

Management Techniques

- Coppice
- Group selection
- Overstory removal
- Shelterwood
- Patch selection
- Direct seeding and planting
- Site preparation
- Intermediate treatments
- Pesticide treatments

Management Considerations

- Maintain and protect existing large, contiguous tracts of bottomland hardwoods, particularly where they exist adjacent to large tracts of upland forest. High-quality tracts of any size should be protected.
- Where possible, manage for larger stands, larger blocks, to increase connectivity with surrounding forest, and to soften sharp transitions between habitat types.
- Manage bottomland hardwood forests as part of an existing natural mosaic of floodplain habitats and ecological gradients from lowlands to uplands.
- Maintain or restore site hydrology whenever feasible.
- Use buffers to protect floodplain systems from negative impacts of surrounding land uses (e.g., sedimentation, pollution).
- Carefully consider both landscape (watershed; surrounding land uses and vegetation; patch size, etc.) and site (hydrology; species composition; soils and topography; stand history; age structure, etc.) features when deciding on a management technique. Several management techniques may be applied depending on the

management objectives, including both uneven-aged and even-aged systems. Use an adaptive management approach, and monitor results.

- Follow DNR Forestry management guidelines for emerald ash borer.
- Manage to maintain or increase tree species diversity, favoring non-ash associates such as silver maple and swamp white oak.
- In areas with a heavy ash component, succession to lowland brush or sedge meadow may occur with the absence of ash. Any management strategy should focus on maintaining potential to reforest the site and preventing conversion to reed canary grass.
- Manage stands for composition and structural diversity by: retaining some large-diameter trees, living and dead cavity trees, snags, and coarse woody debris; creating canopy gaps of varying sizes; creating and maintaining a diversity of age and size classes; and applying extended rotation or managed old-growth management to some stands.
- Conduct timber harvests only under frozen-ground or dry conditions to prevent rutting and soil damage and to protect site hydrology.
- Increase representation of older trees and older stands.
- Protect special features such as riparian areas, oxbows, running sloughs, cut-off sloughs, backwaters, open sandbars, mudflats, and unvegetated vertical banks.
- Plant bottomland hardwood species to increase corridor width of this habitat when opportunities present themselves.
- Limit permanent fragmentation caused by development (roads, parking areas, etc.).
- Consider management for aesthetic and ecological values where this forest type occurs within important recreational corridors and riparian zones.
- Control and limit deer herbivory.